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Project Summary

Roanoke Woodstove Emission Tests

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As part of the Integrated Air Cancer Project (IACP) Roanoke study, this project characterizes and quantifies emissions generated by burning authentic Roanoke cordwood. The burning occurred in a controlled laboratory setting using two woodstoves, each operated at two different burn rates. The project goal was to collect organic and inorganic emissions produced by burning Roanoke wood during high and low burn rate conditions similar to those in a home. The two stoves, a LOPI 380/440 conventional and a LOPI 1988 EPA-certified Answer low-emission model, were run at high and low burn rates simulating burn conditions found in a typical home. Eight sampling runs were conducted consisting of duplicate runs at both burn rates of the two stoves. After sampling, the sampling media, filters, cartridges, canisters, and raw data were distributed to various analytical laboratory groups for analysis. The 380/440 stove generated higher levels of emissions than the Answer stove because the latter incorporated secondary combustion technology. The narrow burn rate range of the Answer stove and the scatter of all the data in general make drawing definitive conclusions on trends difficult. It appears that the conventional stove showed a direct relationship with burn rate for volatile organic emissions and an inverse relationship for extractable organic emissions. Historically, burn rate has been shown to be the major variable affecting emission rates. Data are presented that may be used to calculate emission factors for woodstove use during the IACP Roanoke oil furnace field study.

This Project Summary was developed by EPA's National Risk Management Laboratory's Air Pollution Prevention and Control Division, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

In support of the Integrated Air Cancer Project (IACP) Roanoke study, emissions generated by burning authentic Roanoke cordwood were characterized and quantified. The burning occurred in a controlled laboratory setting using two woodstoves, each operated at two different burn rates. The project goal was to collect organic and inorganic emissions produced by burning Roanoke wood during high and low burn rate conditions similar to those in a home. The two stoves, a LOPI 380/440 conventional and a LOPI 1988 EPA-certified Answer low-emission model, were run at high and low burn rates simulating burn conditions found in a typical home. Eight sampling runs were conducted consisting of duplicate runs at both burn rates of the two stoves. After sampling, the sampling media, filters, cartridges, canisters, and raw data were distributed to various analytical laboratory groups for analysis. This document compiles the work of those researchers.

Conclusions

The target sampling conditions were 0.45-0.9 kg/hr for the low burn rate and 2.25-2.7 kg/hr for the high burn rate. These specific values were not met because of operational characteristics of the Answer stove. As expected, the 380/440 conventional stove tended to generate higher levels of emissions than the low emission Answer stove because the latter incorporates secondary combustion technology.

In general, stack temperature correlated with burn rate, although Burn 3, at 1.05 kg/hr, had a lower average stack temperature than did Burn 4 at 0.72 kg/hr. For Burn 3, the extractable organic matter (EOM), GRAV, polynuclear aromatic hydrocarbons (PAH), total aldehydes, and fine particulate matter were significantly higher than for Burn 4.

The narrow burn rate of the Answer stove, and the scatter of all the data in general, make drawing definitive conclusions on trends difficult. It appears that the conventional stove showed a direct relationship with burn rate for volatile organic emissions and an inverse relationship for extractable organic emissions. Historically, burn rate has been shown to be the major variable affecting emission rates.

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The complete report, entitled "Roanoke Woodstove Emission Tests," (Order No. PB97-131 387; Cost: $21.50, subject to change) will be available only from:
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650
The EPA Project Officer can be contacted at:
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